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UNIVERSITY OF BAHRAIN COLLEGE OF INFORMATION TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE SUMMER SEMESTER 07
ITCS241: Assembly Language Programming First Test Date: JULY 26, 07

QUESTION ONE: Write a complete assembly program that:

[10 pts]

- Defines an array ISA consisting of 96 elements of type double words.
- Randomly generate 96 double words and store the generated values in array ISA.
- Displays in HEX all elements of array ISA as words separated by a space.
- Swaps words in each array element.
- Display on the screen all double words of array ISA in binary one value per line.

```
INCLUDE Irvine32.inc
.DATA
ISA    DWORD    _8 dup(?)
.CODE
MAIN   PROC
    CALL    RANDOMIZE
: Generating random numbers and storing them in array ISA
    MOV     ESI, OFFSET ISA
    MOV     ECX, 8
L0:    CALL    RANDOM32
    MOV     [ESI], eax
    ADD     ESI, 4
    LOOP    L0
    CALL    CRLF
: Display elements of array ISA as dwords (HEX) separated by space
    MOV     ESI, OFFSET ISA
    MOV     EBX, TYPE ISA
    MOV     ECX, LENGTHOF ISA
    CALL    DUMPHEX
    CALL    CRLF
: Swapping the words in each double word
    MOV     ESI, 0
    MOV     ECX, LENGTHOF ISA
L9:    MOV     AX, WORD PTR ISA[ESI]
    XCHG    AX, WORD PTR ISA[ESI+2]
    MOV     WORD PTR ISA[ESI], AX
    ADD     ESI, 4
    LOOP    L9
: Display ARRAY ISA as double words (BIN) ONE VALUE PER LINE
    MOV     ECX, LENGTHOF ISA
    MOV     ESI, 0
L2:    MOV     EAX, ISA[ESI]
    CALL    WRITEBIN
    CALL    CRLF
    ADD     ESI, 4
    LOOP    L2
    CALL    CRLF
main   EXIT
    ENDP
END     MAIN
```

```
:      C00029E2 83C823F6 3A18BE87 15E78471 84CAE1DF 373D6C10 1E2CD60A 6972AE78
:      29E2C000 23F683C8 BE873A18 847115E7 E1DF84CA 6C10373D D60A1E2C AE786972
:
:      0010 1001 1110 0010 1100 0000 0000 0000
:      0010 0011 1111 0110 1000 0011 1100 1000
```

QUESTION TWO:

{10 points}

Choose the BEST correct answer for each of the following questions and write its letter symbol down in the table shown below

- 1) The 8-bit value 10101010 represents unsigned decimal value ____ and signed decimal value ____
a) -170, 86 b) 170, -86 c) 170, -170 d) -86, 170 e) None
- 2) The program that produces .LST files as one of its outputs is:
a) LINK b) MASM c) DEBUG d) Textpad e) None
- 3) The statement that produces syntax error during assembly process is:
a) ADD AX, BX b) SUB EAX, 20H c) XCHG AX, BX
d) SUB BYTE PTR [BX], AX e) INC BYTE PTR [BX]
- 4) The register containing the offset address of the next instruction to be executed:
a) ESI b) EBX c) ECX d) EIP e) None
- 5) The instruction that stores 0 in the memory word pointed by esi register is:
a) MOV esi, 0 b) MOV [esi], 0 c) SUB [esi], [esi]
d) SUB esi, esi e) None
- 6) The register used to store the loop repetition value when using LOOP instruction is:
a) ECX b) EBX c) ESI d) EIP e) None
- 7) The type of the SOURCE operand used in the instruction: MOV BX, offset HI is:
a) Immediate b) Direct c) Indexed d) indirect e) None
- 8) If the physical address is 20000 and the offset value is 39C0, then the segment value will be:
a) 59C0 b) 239C0 c) 1C64 d) 1C640 e) None
- 9) The instruction that subtracts the contents of CX register from the word pointed by ebx register is:
a) SUB CX, [EBX] b) SUB ebx, CX c) SUB [ebx], CX
d) SUB WORD PTR EBX, CX e) None
- 10) The directive that defines an array OUR consisting of 1024 signed words all initialized with -5 is:
a) OUR sword 1024 dup(-5) b) OUR sdword 1024H dup(-5)
c) OUR word 1024H dup(' -5 ') d) OUR sword 1024 dup("-5") e) None

Question #	1	2	3	4	5	6	7	8	9	10
Answer	B	B	D	D	E	A	A	C	C	A

QUESTION THREE:

{10 points}

Assume that

F1 sbyte ?

F2 sbyte ?

- a) Write a sequence of statements to define and calculate the value of **F** as shown in the next equation.
(Not allowed to change the values in F1 and F2).

$$F = F2 * ((F1 - (F1 \% F2)) / F1)$$

F sword ?

1 MOV SX AX, F1

IDIV F2

MOV AL, F1

SUB AL, AH

CBW

IDIV F1

IMUL F2

MOV F, AX

- b) MOV AX, 307CH
MOV BX, 0C080H
DIV BH

AX = 7C 40 H

- c) MOV AL, 50H
CBW
MOV DL, 0D0H
IMUL DL

AX = F1 00 H

0F 00

QUESTION FOUR:

[10 pts]

- (a) Assume UU is a predefined signed memory word, Give NO more than **3 instructions** to perform the following: $EBX = AX - UU * 2$

```

sub    AX, UU
sub    AX, UU
movsx  ebx, ax
    
```

- (b) Assume MOO and FOO are predefined memory quad words, Give NO more than **4 instructions** to perform the following: $MOO = MOO - FOO$

```

mov    eax, dword ptr FOO
mov    ebx, dword ptr FOO+4
sub    dword ptr MOO, eax
sbb    dword ptr MOO+4, ebx
    
```

- (c) Carefully study the following data definitions and instructions then choose the BEST correct answer for each of the following 4 questions.

```

T1    BYTE    11H, 22H, 7FH, 9AH, 2 dup (?)
T2    WORD    6F7FH, 6ACAH, 81CFH, 69CFH, 12A8H
UT    DWORD   725A9033H, 56F14BH, 69CB3A2CH, 248F7C39H
CCC    EQU    $-T1
    
```

```

MOV    BX, WORD PTR T1
MOV    AX, WORD PTR UT+2
MOV    DX, WORD PTR UT-3
MOV    CH, SIZEOF T2
MOV    CL, LENGTHOF UT
    
```

After executing the above instructions,

- The value assigned to the constant name CCC is:
 a) 34 b) 2 (H) c) 32H **d) 32** e) None
- The register AX will contain:
a) 725AH b) 9033H c) 5A72H d) 3390H e) None
- The register DX will contain:
 a) C9CFH b) CFC9H c) A8CFH d) CFA8H **e) None**
- The register CX will contain:
 a) 0405H **b) 0A04H** c) Undefined d) 040AH e) None